PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-313890
(43)Date of publication of application : 08.11.1994

(51)Int.Cl. G02F 1/1343
G02B 5/02
G02F 1/1335
G02F 1/1335

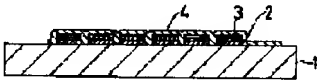
(21)Application number : 05-102124
(22)Date of filing : 28.04.1993

(71)Applicant : TOPPAN PRINTING CO LTD
(72)Inventor : FUKUYOSHI KENZO

(54) BACK PLATE FOR LIQUID CRYSTAL DISPLAY DEVICE AND MANUFACTURE THEREOF

(57)Abstract:

PURPOSE: To provide a rear plate for a liquid crystal display device and a method for the manufacture of the plate, ensuring freedom from a display defect while maintaining the advantage of a reflective type liquid crystal display device, and a wide angle of visibility, regardless of the position of an external illuminant, and having the capability to show a bright screen.



CONSTITUTION: The major section of a back plate is composed of a glass substrate 1, a rectangular metal reflecting film 2 and light scattering film 3 laid in order at such a position as corresponding to a picture element pattern on the substrate 1, a stripe type transparent electrode 4 corresponding to the line or column of a matrix laid on the substrate 1 having the films 2 and 3 and composed of a plurality of picture elements. In this case, the film 2 has an independent pattern form corresponding to the picture element pattern. Thus, even if shortcircuit takes place between the film 2 and a plurality of transparent electrodes, other electrodes are not actuated even at the time of driving liquid crystal under the application of voltage to a transparent electrode at a shortcircuit position. Also, an incident beam is evenly scattered and emitted due to the existence of the film 3.

LEGAL STATUS

[Date of request for examination]	17.03.2000
[Date of sending the examiner's decision of rejection]	30.07.2002
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1] The above-mentioned back plate board for liquid crystal displays which is equipped with the liquid crystal matter enclosed between the back plate board which is characterized by providing the following, and with which two or more transparent electrodes corresponding to the pixel were prepared in the shape of a pattern, an observer lateral-electrode board, and electrode boards, such as this, and impresses and carries out a screen display of the voltage for every pixel to this liquid crystal matter. Substrate. The metallic-reflection film and light-scattering film which were alternatively prepared in the part corresponding to the pixel pattern or transparent-electrode pattern on this substrate one by one. The transparent electrode arranged on the substrate in which metallic-reflection films, such as this, and the light-scattering film were formed.

[Claim 2] The back plate board for liquid crystal displays according to claim 1 characterized by consisting of impalpable powders from which the above-mentioned light-scattering film is distributed in a transparent resin and this transparent resin, and this transparent resin and its refractive index differ.

[Claim 3] The back plate board for liquid crystal displays according to claim 2 characterized by the above-mentioned impalpable powder being amorphous.

[Claim 4] The back plate board for liquid crystal displays according to claim 1, 2, or 3 characterized by transparent protection layer intervening between the above-mentioned light-scattering film and a transparent electrode.

[Claim 5] The back plate board for liquid crystal displays according to claim 1, 2, 3, or 4 characterized by the light-filter layer which colors the transmitted light the pixel part between the above-mentioned light-scattering film and a transparent electrode intervening.

[Claim 6] In the manufacture method of the back plate board for liquid crystal displays according to claim 1, a metallic-reflection film is uniformly formed on a substrate. And after applying a light-scattering nature photosensitivity resist on this metallic-reflection film, exposing and developing negatives and forming a light-scattering layer in the part corresponding to the above-mentioned pixel pattern or the transparent-electrode pattern alternatively, The manufacture method of the back plate board for liquid crystal displays which uses this light-scattering layer as a resist pattern, **********s the above-mentioned metallic-reflection film and is subsequently characterized by preparing a transparent electrode on the substrate in which metallic-reflection

films, such as this, and the light-scattering film were formed.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the back plate board applied to a reflected type liquid crystal display, especially, does not have a display defect and relates to the back plate board for liquid crystal displays in which a bright screen display also with the large angle of visibility is possible, and its manufacture method.

[0002]

[Description of the Prior Art] The principal part consists of liquid crystal matter by which this kind of liquid crystal display was generally enclosed between a polarization film, the electrode board of a couple with which the transparent electrode was prepared respectively, and electrode boards, such as this. And while making into the linearly polarized light first the beam of light which carried out incidence by the polarization film by the side of incidence, and impressing voltage for every pixel to the above-mentioned liquid crystal matter and changing the orientation state, rotate the plane of polarization of the above-mentioned linearly polarized light which passes the part according to the orientation state, respond to the angle of rotation, the above-mentioned linearly polarized light is made to intercept or penetrate by the polarization film by the side of outgoing radiation, and a screen display is performed.

[0003] In addition, the light-filter layer for coloring polarization either of the above-mentioned electrode boards in the electrochromatic display display which displays a color screen is prepared.

[0004] And as this kind of a liquid crystal display, the light source (lamp) is arranged on the rear face or the side of an electrode board (a back plate board is called) which it is located in the tooth-back side of a liquid crystal display, and the bright back light type of the display screen or the light guide type formula transparency type liquid crystal display with a built-in lamp to which incidence of the beam of light was carried out from the back plate board side has spread widely.

[0005] However, in this formula transparency type liquid crystal display with a built-in lamp, in order that power consumption with the lamp might consume displays of other kinds, such as CRT and a plasma display, and the power of an abbreviation EQC greatly, it had the fault from which the feature of the low power of liquid crystal display original is spoiled, and use prolonged at a carrying place becomes difficult.

[0006] On the other hand, the reflected type liquid crystal display which is made

to carry out incidence of the outdoor daylight, such as indoor light and the natural light, from the electrode board (for an observer lateral-electrode board to be called) located in the observer side of equipment, is made to reflect by the metallic-reflection film prepared in the above-mentioned back plate board, and carries out a screen display by this reflected light is also known, without building in such a lamp. And since a lamp is not used in this equipment, power consumption has the advantage that it is small, therefore is equal to the prolonged drive of a carrying place.

[0007] and as a back plate board applied to such a reflected type liquid crystal display For example, the metallic-reflection film b uniformly formed on Substrate a and this substrate a as shown in drawing 4 The thing by which the principal part was constituted from a transparent electrode d prepared through the light-filter layers cR, cG, and cB on this metallic-reflection film b, or the thing by which, as for the transparent electrode d, the above-mentioned metallic-reflection film b was uniformly formed on the a-th page of the substrate of an opposite side as shown in drawing 5 is known.

[0008]

[Problem(s) to be Solved by the Invention] By the way, in this kind of reflected type liquid crystal display, since the above-mentioned metallic-reflection film b reflected an incident ray regularly, it had the trouble that an angle of visibility was restricted by the position of the light source of the outdoor daylight.

[0009] Moreover, since the metallic-reflection film b was constituted by the conductive high metal in the back plate board of the structure shown in drawing 4 , there was a fault which a transparent electrode d tends to connect with the metallic-reflection film b too hastily through the minute defect of the light-filter layers cR, cG, and cB. And in order to impress voltage to other transparent electrodes through the above-mentioned metallic-reflection film b when it connects with two or more transparent electrodes too hastily, and voltage is impressed to the transparent electrode of 1 for a liquid crystal drive, it had the trouble of trouble having arisen in a liquid crystal drive and being easy to cause a display defect.

[0010] On the other hand, since the above-mentioned metallic-reflection film b is exposed to a front face, a blemish tended to take lessons also for the back plate board smell of the structure shown in drawing 5 from this metallic-reflection film b in a manufacture stage etc., and the trouble which causes a display defect on the occasion of a screen display was.

[0011] this invention was made paying attention to such a trouble, and the place made into the technical problem has a display defect in it being concerned with

the position of the outdoor daylight light source without **, and offering the back plate board for liquid crystal displays in which a screen display [be / nothing] with it is possible, and its manufacture method, with the advantage of a reflected type liquid crystal display maintained. / a large and angle of visibility and / bright

[0012]

[Means for Solving the Problem] Namely, the back plate board with which two or more transparent electrodes to which invention concerning a claim 1 corresponded to the pixel were prepared in the shape of a pattern, It has the liquid crystal matter enclosed between an observer lateral-electrode board and electrode boards, such as this, and is premised on the above-mentioned back plate board for liquid crystal displays which impresses and carries out a screen display of the voltage for every pixel to this liquid crystal matter. A substrate, It is characterized by providing the transparent electrode arranged on the substrate in which the metallic-reflection film and light-scattering film which were alternatively prepared in the part corresponding to the pixel pattern or transparent-electrode pattern on this substrate one by one, metallic-reflection films, such as this, and the light-scattering film were formed.

[0013] According to the back plate board concerning this invention according to claim 1, the above-mentioned metallic-reflection film is different from the conventional thing uniformly prepared on the substrate side, and it is alternatively prepared in the part corresponding to the pixel pattern or transparent-electrode pattern on the above-mentioned substrate. And since a pixel pattern or transparent-electrode patterns, such as this, have the pattern configuration where it became independent mutually, they have the pattern configuration where the metallic-reflection film corresponding to patterns, such as this, also became independent. Therefore, since between two or more transparent electrodes does not flow through a metallic-reflection film even if it is the case where a short circuit is produced between the metallic-reflection film which has the pattern configuration where it became independent, and two or more transparent electrodes, in case voltage is impressed to the transparent electrode of 1 and the liquid crystal matter is driven, the screen display which other transparent electrodes do not drive and does not have a defect becomes possible.

[0014] In addition, a well-known configuration is sufficient as each of above-mentioned pixel patterns or transparent-electrode patterns, for example, when using it as a back plate board of the liquid crystal display of a simple matrix drive, the above-mentioned pixel pattern is an abbreviation

rectangle-like pattern of a large number arranged in the shape of a matrix, and another side and a transparent-electrode pattern are stripe-like patterns corresponding to the line or train of a matrix which the pixel of these plurality constitutes.

[0015] Moreover, since it is uniformly scattered about with the light-scattering film prepared on the above-mentioned metallic-reflection film, and it is reflected by the metallic-reflection film and outgoing radiation of the beam of light which carried out incidence from the observer lateral-electrode board according to the back plate board concerning invention according to claim 1 is carried out from an observer lateral-electrode board, it becomes possible for the degree of incident angle of the incident ray not to be caused how, but to make the bright display screen observe in all directions of it.

[0016] And invention concerning a claim 2 relates to invention which specified the composition of the light-scattering film which produces this scattering phenomenon.

[0017] That is, invention concerning a claim 2 is characterized by consisting of impalpable powders from which the above-mentioned light-scattering film is distributed in a transparent resin and this transparent resin on the assumption that the back plate board for liquid crystal displays concerning invention according to claim 1, and this transparent resin and its refractive index differ.

[0018] In invention concerning this claim 2, material with visible-ray permeability high as the above-mentioned transparent resin is desirable, for example, acrylic resins, such as a polymethylmethacrylate resin, can be applied. Moreover, since patterning of this light-scattering film is made easy so that it may mention later, it is also possible to apply the photopolymer of the acrylic which has photosensitivity, or an epoxy system.

[0019] On the other hand, the impalpable-powder material which has a high refractive index regardless of inorganic and organic ones as the above-mentioned impalpable powder is desirable, for example, the mixture of impalpable powders, such as titanium oxide, a zirconium oxide, a lead oxide, an aluminum oxide, silicon oxide, a magnesium oxide, a magnesium carbonate, a zinc oxide, a barium sulfate, and a polytetrafluoroethylene, or these impalpable powders can be used. Moreover, what performed suitable surface treatment for the front face is sufficient as these impalpable powders, as such surface treatment, covering processing of the front face can be carried out by SiO2, ZrO2, aluminum 2O3, ZnO or the resin, the coupling agent, etc., or they can illustrate the processing which produces surface reaction in alcohol, an amine or an organic acid, etc. Moreover,

as a configuration of these impalpable powders, there are a globular form, a disk form, a go stone form, a polygon, a rhombus, square board type, etc., and it is arbitration.

[0020] In addition, the plane of polarization rotates, since outgoing radiation of the linearly polarized light which carried out incidence into the crystalline substance of these impalpable powders is carried out, control of the plane of polarization by the drive of the liquid crystal matter has a bird clapper difficult, and it has the case where it becomes impossible to fully control the light and darkness of a screen. On the other hand, since outgoing radiation of the linearly polarized light which carried out incidence into the amorphous impalpable powder is carried out with the plane of polarization maintained, it does not cause trouble to control of the plane of polarization by liquid crystal drive.

[0021] Invention concerning a claim 3 is made based on such a reason for technical.

[0022] That is, invention concerning a claim 3 is characterized by the above-mentioned impalpable powder being amorphous a premise [the back plate board for liquid crystal displays concerning invention according to claim 2].

[0023] as such an amorphous impalpable powder -- SiO2 etc. -- the impalpable powder of a polytetrafluoroethylene etc. is applicable in the end of a glass powder

[0024] Moreover, in invention concerning claims 2-3, 0.05-1 micrometer near the wavelength of a visible ray as a particle size of the above-mentioned impalpable powder is desirable, and it is also possible to apply the mixture of two or more kinds of impalpable powders from which particle size distribution differ mutually. In addition, although the impalpable powder with a larger path than 1 micrometer may be somewhat mixed in the impalpable powder, it is more desirable than the liquid crystal cell gap with which the liquid crystal matter is enclosed in a liquid crystal display for a path to be the size which does not bar the small and normal orientation state of the liquid crystal matter. On the other hand, it becomes a path is more nearly able to use a small impalpable powder than 0.05 micrometers, for example, possible to prevent the rotatory polarization of the above-mentioned incident ray at the time of applying a crystalline-substance impalpable powder by considering as an about 0.01-0.2-micrometer impalpable powder. Moreover, it is also possible by performing suitable surface treatment for an impalpable-powder front face to prevent the rotatory polarization of the above-mentioned incident ray.

[0025] In addition, the back plate board concerning this invention may be equipped with transparent protection layer between a light-scattering film and

a transparent electrode in order to protect a metallic-reflection film and a light-scattering film, and it may be equipped with a light-filter layer between a light-scattering film and a transparent electrode in order to make [and] a color screen display possible.

[0026] Invention concerning claims 4-5 is made from such a reason.

[0027] Namely, invention concerning a claim 4 is premised on the back plate board for liquid crystal displays concerning invention according to claim 1, 2, or 3. Invention which is characterized by transparent protection layer intervening between the above-mentioned light-scattering film and a transparent electrode, and relates to a claim 5 It is characterized by the light-filter layer which colors the transmitted light the pixel part between the above-mentioned light-scattering film and a transparent electrode on the assumption that the back plate board for liquid crystal displays concerning invention according to claim 1, 2, 3, or 4 intervening.

[0028] And in invention concerning a claim 4, resins, such as an epoxy resin, polyester resin, melamine resin, silicon resin, and a HORIIMIDO resin, can be illustrated as the above-mentioned transparent protection layer in consideration of protection performances, such as visible-ray permeability, and thermal resistance or chemical resistance. Moreover, what is necessary is just to apply the resin of the acrylic which has photosensitivity, or an epoxy system, in forming this transparent protection layer in the part corresponding to the pixel pattern or transparent-electrode pattern on a substrate alternatively from the reasons of a manufacturing process. Furthermore, this may consist of inorganic-oxide thin films of SiO2 grade as transparent protection layer.

[0029] Moreover, in invention concerning a claim 5, about the above-mentioned light-filter layer, an organic pigment is distributed in a photopolymer by well-known FOTORISOPUROSESU, and it applies, and it can expose, develop negatives and form or can form by carrying out dyeing a resin film with a color etc. Moreover, it is also possible to print the printing ink containing a coloring matter by print processes, such as offset printing, intaglio printing offset printing, screen-stencil, and flexographic printing, and to form it. Although it is desirable to have each light-filter layer of red and three green and blue colors which is the three primary colors of light for every pixel as for this light-filter layer, they may be the cyanogen which is not limited to these 3 color and corresponds to the complementary color of the three above-mentioned color, a Magenta, and three colors of yellow. Moreover, you may be the light-filter layer of four colors which added white to the three primary

colors of these light, or three colors of the complementary color further. In addition, when a polarizing plate may be arranged on the above-mentioned light-scattering film in invention concerning claims 1-5 and it uses this electrode board for the display of STN LCD, a phase contrast board can also be arranged on the above-mentioned light-scattering film.

[0030] Next, invention concerning a claim 6 relates to the manufacture method of the back plate board for liquid crystal displays concerning invention according to claim 1.

[0031] Namely, invention concerning a claim 6 is premised on the manufacture method of the back plate board for liquid crystal displays concerning invention according to claim 1. Form a metallic-reflection film uniformly on a substrate, and a light-scattering nature photosensitivity resist is applied on this metallic-reflection film. After exposing and developing negatives and forming a light-scattering layer in the part corresponding to the above-mentioned pixel pattern or the transparent-electrode pattern alternatively, this light-scattering layer is used as a resist pattern, and the above-mentioned metallic-reflection film is **********ed. subsequently It is characterized by preparing a transparent electrode on the substrate in which metallic-reflection films, such as this, and the light-scattering film were formed.

[0032] In addition, in case it **********s and patterning of the above-mentioned metallic-reflection film is carried out, it is desirable to carry out patterning of the mark for alignment (alignment mark) used at the back processes at the time of transparent-electrode formation etc. to the exterior of the display screen field of a liquid crystal display, and to form it in it. Since this alignment mark made from a metallic-reflection film has a very high reflection factor compared with the alignment mark constituted from same material as black ink or a transparent electrode, in case it makes an alignment mark read optically with an automatic machine and carries out alignment, it has the advantage which can perform this easily and with high precision.

[0033] In addition, as a substrate which constitutes some above-mentioned back plate boards in invention concerning claims 1-6, a glass plate, a ceramic board, plastic film, a plastics board, etc. can be used, and it may be transparent or opaque. Moreover, from a viewpoint which prevents the light reflex from the part between white or the pixels in which the above-mentioned metallic-reflection film does not exist although it may be colored black, and aims at improvement in contrast of the display screen, what was colored the high color of optical-absorption nature, such as black, is desirable. Moreover, the above-mentioned substrate may be the

plastics board and plastic film which could be backed with the metal plate in order to raise heat dissipation nature and rigidity, and laminated metal thin films, such as aluminum. in addition -- the case where it has the thin film of the metal which is easy to oxidize like an aluminum thin film -- SiO2 etc. -- after ******ing an inorganic-oxide thin film, you may form the above-mentioned metal thin film

[0034] Moreover, as a material applicable to the above-mentioned metallic-reflection film in invention concerning claims 1-6, a metal with high visible-ray reflection factors, such as aluminum, an aluminium alloy, silver, magnesium, a nickel alloy, a potassium, sodium, a rhodium, zinc, and antimony, may be desirable, and you may be the multilayer which carried out the laminating of the plurality of these quantities reflection factor metal. Moreover, you may prepare inorganic-oxide thin film, magnesium, etc. fluoride on these metallic-reflections film in the range out of which trouble does not come to etching processing in the patterning process of these metallic-reflections film.

[0035] On the other hand, the ITO thin film which mixes a tin oxide as a dopant and changes in indium oxide as a transparent electrode, the thin film constituted by adding a zirconium oxide, titanium oxide, or a magnesium oxide in indium oxide, or the thin film constituted by adding an aluminum oxide in a zinc oxide is applicable.

[0036] In addition, the back plate board concerning this invention can be applied as a back plate board of various reflected type liquid crystal displays, such as TN (twist pneumatic) type liquid crystal display, a STN (super twist pneumatic) type liquid crystal display, ferroelectric liquid crystal display, an antiferroelectricity liquid crystal display, a HOMEOTORO pick liquid crystal display, polymer dispersed liquid crystal display, and a guest host type liquid crystal display.

[0037]

[Function] According to invention concerning claims 1-5, on the substrate side, a metallic-reflection film is different from the conventional thing prepared uniformly, and the metallic-reflection film is prepared alternatively at the part corresponding to the pixel pattern or transparent-electrode pattern on the above-mentioned substrate. And since a pixel pattern or transparent-electrode patterns, such as this, have the pattern configuration where it became independent mutually, they have the pattern configuration where the metallic-reflection film corresponding to patterns, such as this, also became independent.

[0038] Therefore, since between two or more transparent electrodes does not flow through a metallic-reflection film even if

it is the case where a short circuit is produced between the metallic-reflection film which has the pattern configuration where it became independent, and two or more transparent electrodes, in case voltage is impressed to the transparent electrode of 1 and the liquid crystal matter is driven, the screen display which other transparent electrodes do not drive and does not have a defect becomes possible.

[0039] Moreover, since it is uniformly scattered about with the light-scattering film prepared on the above-mentioned metallic-reflection film, and it is reflected by the metallic-reflection film and outgoing radiation of the beam of light which carried out incidence from the observer lateral-electrode board is carried out from an observer lateral-electrode board, it becomes possible for the degree of incident angle of the incident ray not to be caused how, but to make the bright display screen observe in all directions of it.

[0040] On the other hand, according to invention concerning a claim 6, a metallic-reflection film is uniformly formed on a substrate. And after applying a light-scattering nature photosensitivity resist on this metallic-reflection film, exposing and developing negatives and forming a light-scattering layer in the part corresponding to the above-mentioned pixel pattern or the transparent-electrode pattern alternatively, This light-scattering layer is used as a resist pattern, and the above-mentioned metallic-reflection film is **********ed. subsequently Since the transparent electrode is prepared on the substrate in which metallic-reflection films, such as this, and the light-scattering film were formed, It becomes possible to manufacture that it is simple and certainly the back plate board for liquid crystal displays concerning invention according to claim 1 which possesses the metallic-reflection film by which position adjustment was carried out, and a light-scattering film to the part corresponding to the pixel pattern or the transparent-electrode pattern.

[0041]

[Example] Hereafter, with reference to a drawing, the example of this invention is explained in detail.

[0042] [Example 1] the back plate board for liquid crystal displays concerning this example As shown in drawing 1 , it is a pixel pattern on a glass substrate 1 and this glass substrate 1 with a thickness of 0.7mm (310 micrometers by [1 pixel :] 90 micrometers). The pitch of an array : The metallic-reflection film 2 of the shape of a rectangle with a thickness of 0.8 micrometers prepared in the part corresponding to 110 micrometers of longitudinal directions, and 330 micrometers of lengthwise, The principal part consists of transparent electrodes 4

of the stripe configuration corresponding to the line or train of a matrix which it is arranged on the glass substrate 1 with which the light-scattering film 3 which position adjustment was carried out and was prepared on this metallic-reflection film 2, the metallic-reflection films 2, such as this, and the light-scattering film 3 were formed, and two or more pixels constitute.

[0043] In addition, the above-mentioned metallic-reflection film 2 is constituted from an aluminum thin film with a thickness of 0.8 micrometers, and the titanium oxide impalpable powder of 0.1 micrometers of mean particle diameters constitutes the light-scattering film 3 from a film with a thickness of 0.5 micrometers distributed uniformly in the photosensitive transparent resin which gave photosensitivity by making a phenol novolak epoxy resin into a frame. On the other hand, the above-mentioned transparent electrode 4 consists of ITO thin films with a thickness of 240nm which added the tin oxide as a dopant to indium oxide.

[0044] And this back plate board is manufactured through the following processes.

[0045] Namely, as shown in drawing 2 (A), after carrying out sputtering of the aluminum of 0.8 micrometers of thickness uniformly and forming metallic-reflection film 2' on the 1st page of a glass substrate, as shown in drawing 2 (B) Phenol novolak epoxy photosensitivity transparent resin 3' by which the titanium oxide impalpable powder was distributed uniformly was applied to up to above-mentioned metallic-reflection film 2', negatives were exposed and developed in the shape of a pixel pattern, and the rectangle-like light-scattering layer 3 was formed (refer to drawing 2 C). Next, the formed light-scattering layer 3 was used as the resist pattern, and above-mentioned metallic-reflection film 2' was **********ed by having made phosphoric acid, the nitric acid, the acetic acid, and the mixed acid of water into the etching reagent, and the metallic-reflection film 2 of the same configuration as the light-scattering layer 3 was formed (refer to drawing 2 D).

[0046] Next, after drying the glass substrate 1 with which the metallic-reflection film 2 and the light-scattering film 3 were formed on 200 degrees C and the conditions for 30 minutes, the back plate board which formed the ITO thin film uniformly, performed well-known photolithography processing using the positive resist, formed the transparent electrode 4 of the above-mentioned stripe configuration on the glass substrate 1 with which the metallic-reflection films 2, such as this, and the light-scattering film 3 were formed, and was shown in drawing 1 was manufactured.

[0047] the back plate board applied to an example 1 except for the point that provide the light-filter layers 5R, 5G, and 5B of three colors (red and green -- and blue) which position adjustment was carried out and were prepared on the above-mentioned light-scattering film 3, and the transparent protection layer 6 by which application formation was uniformly carried out on the whole surface, and the above-mentioned transparent electrode 4 is arranged on this transparent protection layer 6 as shown in [example 2] drawing 3 , and abbreviation -- it is the same

[0048] In addition, the above-mentioned light-filter layers 5R, 5G, and 5B are SMX by TOYO INK MFG. CO., LTD., respectively. CF In thickness of about 1.7 micrometers, an intaglio printing offset is carried out and the red ink of SME, green ink, and blue ink are constituted. Moreover, a phenol novolak epoxy photopolymer with a thickness of 1 micrometer constitutes transparent protection layer 6, and the above-mentioned transparent electrode 4 consists of ITO thin films with a thickness of 250nm which added the tin oxide as a dopant to indium oxide.

[0049]

[Effect of the Invention] Since according to invention concerning claims 1-5 between two or more transparent electrodes does not flow through a metallic-reflection film even if it is the case where a short circuit is produced between the metallic-reflection film which has the pattern configuration where it became independent, and two or more transparent electrodes, The screen display which other transparent electrodes do not drive and does not have a defect in case voltage is impressed to the transparent electrode of 1 and the liquid crystal matter is driven becomes possible. And since it is uniformly scattered about with the light-scattering film prepared on the above-mentioned metallic-reflection film, and it is reflected by the metallic-reflection film and outgoing radiation of the beam of light which carried out incidence from the observer lateral-electrode board is carried out from an observer lateral-electrode board, It becomes possible for the degree of incident angle of the incident ray not to be caused how, but to make the bright display screen observe in all directions.

[0050] Therefore, it has the effect that a display defect is concerned with the position of the outdoor daylight light source without **, and the back plate board for liquid crystal displays in which a screen display [be / nothing] with it is possible can be offered, with the advantage of a reflected type liquid crystal display maintained. / a large and angle of visibility and / bright

[0051] On the other hand, according to invention concerning a claim 6, it has the effect that the back plate board for liquid

crystal displays concerning invention possessing the metallic-reflection film by which position adjustment was carried out at the part corresponding to the pixel pattern or the transparent-electrode pattern, and a light-scattering film according to claim 1 can be manufactured that it is simple and certainly.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The cross section of the back plate board concerning an example 1.

[Drawing 2] Explanatory drawing showing the manufacturing process of the back plate board concerning an example 1.

[Drawing 3] The cross section of the back plate board concerning an example 2.

[Drawing 4] The cross section of the back plate board concerning the conventional example.

[Drawing 5] The cross section of the back plate board concerning the conventional example.

[Description of Notations]

1 Glass Substrate

2 Metallic-Reflection Film

3 Light-Scattering Film

4 Transparent Electrode

5R Light-filter layer

5G Light-filter layer

5B Light-filter layer

6 Transparent Protection Layer

(19)日本国特許庁（ＪＰ）　(12)**公開特許公報**（Ａ）　(11)特許出願公開番号

特開平6－313890

(43)公開日　平成６年(1994)11月８日

(51)Int.Cl.[5]		識別記号	庁内整理番号	Ｆ Ｉ	技術表示箇所
Ｇ０２Ｆ	1/1343		9017－2Ｋ		
Ｇ０２Ｂ	5/02	Ｂ	9224－2Ｋ		
Ｇ０２Ｆ	1/1335	５０５	8507－2Ｋ		
		５２５	7408－2Ｋ		

審査請求　未請求　請求項の数６　ＯＬ　（全　６　頁）

(21)出願番号　特願平5－102124

(22)出願日　平成５年(1993)４月28日

(71)出願人　000003193
凸版印刷株式会社
東京都台東区台東１丁目５番１号

(72)発明者　福吉　健蔵
東京都台東区台東一丁目５番１号　凸版印刷株式会社内

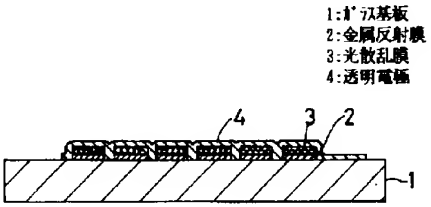
(74)代理人　弁理士　上田　章三

(54)【発明の名称】　液晶表示装置用背面電極板とその製造方法

(57)【要約】

【目的】　反射型液晶表示装置の利点を維持したまま表示欠陥ががなく外光光源の位置に関わりなく視野角が広くしかも明るい画面表示が可能な液晶表示装置用背面電極板とその製造方法を提供すること。

【構成】　この背面電極板は、ガラス基板１と、この基板上の画素パターンに対応した部位に順次設けられた矩形状の金属反射膜２及び光散乱膜３と、これ等金属反射膜と光散乱膜が設けられた基板上に配設され複数の画素が構成するマトリクスの行又は列に対応するストライプ形状の透明電極４とでその主要部が構成されている。そして、上記金属反射膜２は画素パターンに対応する独立したパターン形状を有しているため、金属反射膜と複数の透明電極との間で短絡を生じた場合であっても、これら短絡した一の透明電極に電圧を印加して液晶を駆動する際にも他の透明電極が駆動されることがない。また、入射光線は光散乱膜３により均一に散乱されて出射される。



1

【特許請求の範囲】

【請求項１】画素に対応した複数の透明電極がパターン状に設けられた背面電極板と、観察者側電極板と、これ等の電極板間に封入された液晶物質とを備え、この液晶物質に対し画素毎に電圧を印加して画面表示する液晶表示装置用の上記背面電極板において、

基板と、この基板上の画素パターン若しくは透明電極パターンに対応した部位に選択的に順次設けられた金属反射膜並びに光散乱膜と、これ等金属反射膜と光散乱膜が形成された基板上に配設された透明電極とを具備することを特徴とする液晶表示装置用背面電極板。

【請求項２】上記光散乱膜が、透明樹脂と、この透明樹脂中に分散されこの透明樹脂とその屈折率が異なる微粉末とで構成されていることを特徴とする請求項１記載の液晶表示装置用背面電極板。

【請求項３】上記微粉末が非晶質であることを特徴とする請求項２記載の液晶表示装置用背面電極板。

【請求項４】上記光散乱膜と透明電極との間に透明保護層が介在されていることを特徴とする請求項１、２又は３記載の液晶表示装置用背面電極板。

【請求項５】上記光散乱膜と透明電極との間の画素部位に透過光を着色するカラーフィルター層が介在されていることを特徴とする請求項１、２、３又は４記載の液晶表示装置用背面電極板。

【請求項６】請求項１記載の液晶表示装置用背面電極板の製造方法において、

基板上に金属反射膜を一様に成膜し、かつ、この金属反射膜上に光散乱性感光性レジストを塗布し、露光・現像して上記画素パターン若しくは透明電極パターンに対応した部位に光散乱層を選択的に形成した後、この光散乱層をレジストパターンにして上記金属反射膜をエッチングし、次いで、これ等金属反射膜と光散乱膜が形成された基板上に透明電極を設けることを特徴とする液晶表示装置用背面電極板の製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、反射型液晶表示装置に適用される背面電極板に係り、特に、表示欠陥がなくその視野角も広く明るい画面表示が可能な液晶表示装置用背面電極板とその製造方法に関するものである。

【０００２】

【従来の技術】この種の液晶表示装置は、一般に、偏光膜と透明電極が各々設けられた一対の電極板と、これ等の電極板間に封入された液晶物質とでその主要部が構成されている。そして、入射した光線をまず入射側の偏光膜で直線偏光にし、かつ、上記液晶物質に対し画素毎に電圧を印加してその配向状態を変化させると共に、その配向状態によりその部位を通過する上記直線偏光の偏光面を回転させその回転角に応じて出射側の偏光膜で上記直線偏光を遮断若しくは透過させて画面表示を行うものである。

2

【０００３】尚、カラー画面を表示するカラー液晶表示装置においては上記電極板のいずれか一方に偏光を着色するためのカラーフィルター層が設けられている。

【０００４】そして、この種の液晶表示装置としては、液晶表示装置の背面側に位置する電極板（背面電極板と称する）の裏面若しくは側面に光源（ランプ）を配置し、背面電極板側から光線を入射させた表示画面の明るいバックライト型あるいはライトガイド型のランプ内蔵式透過型液晶表示装置が広く普及している。

【０００５】しかし、このランプ内蔵式透過型液晶表示装置においては、そのランプによる消費電力が大きくＣＲＴやプラズマディスプレイ等他の種類のディスプレイと略同等の電力を消費するため、液晶表示装置本来の低消費電力といった特徴を損ない、また、携帯先で長時間の利用が困難となる欠点を有していた。

【０００６】他方、このようなランプを内蔵することなく、装置の観察者側に位置する電極板（観察者側電極板と称する）から室内光や自然光等の外光を入射させ、上記背面電極板に設けられた金属反射膜で反射させこの反射光で画面表示する反射型液晶表示装置も知られている。そして、この装置においてはランプを利用しないことから消費電力が小さく、従って、携帯先の長時間駆動に耐えるという利点を有している。

【０００７】そして、このような反射型液晶表示装置に適用される背面電極板としては、例えば、図４に示すように基板ａと、この基板ａ上に一様に形成された金属反射膜ｂと、この金属反射膜ｂ上にカラーフィルター層ｃＲ、ｃＧ、ｃＢを介して設けられた透明電極ｄとでその主要部が構成されたもの、あるいは、図５に示すように上記金属反射膜ｂが透明電極ｄとは反対側の基板ａ面上に一様に設けられたもの等が知られている。

【０００８】

【発明が解決しようとする課題】ところで、この種の反射型液晶表示装置においては、上記金属反射膜ｂが入射光線を正反射するためその外光の光源の位置によって視野角が制限されるという問題点を有していた。

【０００９】また、図４に示された構造の背面電極板においては金属反射膜ｂが導電性の高い金属により構成されているため、カラーフィルター層ｃＲ、ｃＧ、ｃＢの微小欠陥を介して金属反射膜ｂと透明電極ｄとが短絡し易い欠点があった。そして、複数の透明電極と短絡した場合、液晶駆動のため一の透明電極に電圧が印加された際に上記金属反射膜ｂを介して他の透明電極にも電圧が印加されるようになるため、液晶駆動に支障が生じ表示欠陥を起こし易い問題点を有していた。

【００１０】他方、図５に示された構造の背面電極板においも、上記金属反射膜ｂが表面に露出しているため製造段階等でこの金属反射膜ｂに傷がつき易く、画面表示に際して表示欠陥を引起こす問題点があった。

【００１１】本発明はこのような問題点に着目してなされたもので、その課題とするところは、反射型液晶表示装置の利点を維持したまま、表示欠陥がなく外光光源の位置に関わりなく視野角が広くしかも明るい画面表示が可能な液晶表示装置用背面電極板とその製造方法を提供することにある。

【００１２】

【課題を解決するための手段】すなわち、請求項１に係る発明は、画素に対応した複数の透明電極がパターン状に設けられた背面電極板と、観察者側電極板と、これ等の電極板間に封入された液晶物質とを備え、この液晶物質に対し画素毎に電圧を印加して画面表示する液晶表示装置用の上記背面電極板を前提とし、基板と、この基板上の画素パターン若しくは透明電極パターンに対応した部位に選択的に順次設けられた金属反射膜並びに光散乱膜と、これ等金属反射膜と光散乱膜が形成された基板上に配設された透明電極とを具備することを特徴とするものである。

【００１３】この請求項１記載の発明に係る背面電極板によれば、上記金属反射膜は基板面上に一様に設けられていた従来のものと相違して上記基板上の画素パターン若しくは透明電極パターンに対応した部位に選択的に設けられており、かつ、これ等の画素パターン若しくは透明電極パターンは互いに独立したパターン形状を有しているためこれ等パターンに対応した金属反射膜も独立したパターン形状を有している。従って、独立したパターン形状を有する金属反射膜と複数の透明電極との間で短絡を生じた場合であっても、金属反射膜を介して複数の透明電極間が導通することはないため、一の透明電極に電圧を印加して液晶物質を駆動する際にも他の透明電極が駆動されることがなく、欠陥のない画面表示が可能となる。

【００１４】尚、上記画素パターン若しくは透明電極パターンはいずれも周知の形状でよく、例えば、単純マトリクス駆動の液晶表示装置の背面電極板として使用する場合には、上記画素パターンはマトリクス状に配列された多数の略矩形状パターンであり、他方、透明電極パターンはこれら複数の画素が構成するマトリクスの行又は列に対応するストライプ状パターンである。

【００１５】また、請求項１記載の発明に係る背面電極板によれば、観察者側電極板から入射した光線は上記金属反射膜上に設けられた光散乱膜により均一に散乱されかつ金属反射膜で反射されて観察者側電極板から出射されるため、その入射光線の入射角度の如何によらずあらゆる方向で明るい表示画面を観察させることが可能となる。

【００１６】そして、請求項２に係る発明はこの散乱現象を生じさせる光散乱膜の構成を特定した発明に関するものである。

【００１７】すなわち、請求項２に係る発明は、請求項１記載の発明に係る液晶表示装置用背面電極板を前提とし、上記光散乱膜が、透明樹脂と、この透明樹脂中に分散されこの透明樹脂とその屈折率が異なる微粉末とで構成されていることを特徴とするものである。

【００１８】この請求項２に係る発明において、上記透明樹脂としては可視光線透過率の高い材料が望ましく、例えば、ポリメチルメタクリレート樹脂等のアクリル系樹脂が適用できる。また、後述するように、この光散乱膜のパターニングを容易にさせるため、感光性を有するアクリル系又はエポキシ系の感光性樹脂を適用することも可能である。

【００１９】他方、上記微粉末としては無機・有機を問わず高屈折率を有する微粉末材料が望ましく、例えば、酸化チタン、酸化ジルコニウム、酸化鉛、酸化アルミニウム、酸化ケイ素、酸化マグネシウム、炭酸マグネシウム、酸化亜鉛、硫酸バリウム、ポリテトラフルオロエチレン等の微粉末あるいはこれら微粉末の混合物が利用できる。また、これら微粉末は、その表面に適当な表面処理を施したものでもよく、このような表面処理としては、SiO_2、ZrO_2、Al_2O_3、ＺｎＯあるいは樹脂やカップリング剤等で表面を被覆処理したり、アルコールやアミン又は有機酸等で表面反応を生じさせたりする処理が例示できる。また、これら微粉末の形状としては、球形、円盤形、碁石形、多角形、菱形、正方板形等があり任意である。

【００２０】尚、これら微粉末の結晶質内に入射した直線偏光はその偏光面が回転して出射されるため液晶物質の駆動による偏光面の制御が困難になることがあり、画面の明暗を十分に制御できなくなる場合がある。これに対し、非晶質の微粉末内に入射した直線偏光はその偏光面を維持したまま出射されるため、液晶駆動による偏光面の制御に支障を来すことがない。

【００２１】請求項３に係る発明はこのような技術的理由に基づいてなされている。

【００２２】すなわち、請求項３に係る発明は、請求項２記載の発明に係る液晶表示装置用背面電極板を前提とし、上記微粉末が非晶質であることを特徴とするものである。

【００２３】このような非晶質微粉末としては、SiO_2等のガラス粉末、ポリテトラフルオロエチレンの微粉末等が適用できる。

【００２４】また、請求項２～３に係る発明において上記微粉末の粒径としては可視光線の波長に近い０．０５～１μｍが望ましく、互いに粒度分布の異なる二種類以上の微粉末の混合物を適用することも可能である。尚、微粉末の中に１μｍより径の大きい微粉末が多少混入されていてもよいが、液晶表示装置において液晶物質が封入される液晶セルギャップより径が小さくかつ液晶物質の正常な配向状態を妨げない大きさであることが望ましい。他方、０．０５μｍより径が小さい微粉末を使用す

ることも可能であり、例えば０．０１～０．２μｍ程度の微粉末とすることにより結晶質微粉末を適用した場合の上記入射光線の偏光面の回転を防止することが可能となる。また、微粉末表面に適当な表面処理を施すことにより上記入射光線の偏光面の回転を防止することも可能である。

【００２５】尚、本発明に係る背面電極板は、金属反射膜や光散乱膜を保護するため光散乱膜と透明電極との間に透明保護層を備えるものであってよく、また、カラー画面表示を可能とするため光散乱膜と透明電極の間にカラーフィルター層を備えるものであってもよい。

【００２６】請求項４～５に係る発明はこのような理由からなされたものである。

【００２７】すなわち、請求項４に係る発明は、請求項１、２又は３記載の発明に係る液晶表示装置用背面電極板を前提とし、上記光散乱膜と透明電極との間に透明保護層が介在されていることを特徴とするものであり、また、請求項５に係る発明は、請求項１、２、３又は４記載の発明に係る液晶表示装置用背面電極板を前提とし、上記光散乱膜と透明電極との間の画素部位に透過光を着色するカラーフィルター層が介在されていることを特徴とするものである。

【００２８】そして、請求項４に係る発明において上記透明保護層としては、可視光線透過率や耐熱性又は耐薬品性等の保護性能を考慮し、エポキシ樹脂、ポリエステル樹脂、メラミン樹脂、シリコン樹脂、ポリイミド樹脂等の樹脂が例示できる。また、製造工程上の理由から、この透明保護層を基板上の画素パターン若しくは透明電極パターンに対応した部位に選択的に形成する場合には感光性を有するアクリル系又はエポキシ系の樹脂を適用すればよい。更に、透明保護層としてSiO_2等の無機酸化物薄膜でこれを構成してもよい。

【００２９】また、請求項５に係る発明において、上記カラーフィルター層については周知のフォトリソプロセスにより有機顔料を感光性樹脂中に分散して塗布し、露光・現像して形成したり、あるいは、樹脂膜を染料で染色する等して形成することができる。また、着色材を含む印刷インキを、オフセット印刷、凹版オフセット印刷、スクリーン印刷、フレキソ印刷等の印刷法により印刷して形成することも可能である。かかるカラーフィルター層は、光の三原色である赤色、緑色、及び青色の三色の各カラーフィルター層を画素毎に備えることが望ましいが、これら三色に限定されるものではなく、上記三色の補色に該当するシアン、マゼンタ、及びイエローの三色であってもよい。また、これら光の三原色又はその補色の三色に更に白色を加えた四色のカラーフィルター層であってもよい。尚、請求項１～５に係る発明において上記光散乱膜上に偏光板を配置してもよく、また、この電極板をＳＴＮ液晶の表示装置に利用する場合には、上記光散乱膜上に位相差板を配置することもできる。

【００３０】次に、請求項６に係る発明は請求項１記載の発明に係る液晶表示装置用背面電極板の製造方法に関するものである。

【００３１】すなわち、請求項６に係る発明は、請求項１記載の発明に係る液晶表示装置用背面電極板の製造方法を前提とし、基板上に金属反射膜を一様に成膜し、かつ、この金属反射膜上に光散乱性感光性レジストを塗布し、露光・現像して上記画素パターン若しくは透明電極パターンに対応した部位に光散乱層を選択的に形成した後、この光散乱層をレジストパターンにして上記金属反射膜をエッチングし、次いで、これ等金属反射膜と光散乱膜が形成された基板上に透明電極を設けることを特徴とするものである。

【００３２】尚、上記金属反射膜をエッチングしてパターニングする際、液晶表示装置の表示画面領域の外部に、透明電極形成時等の後工程で利用する位置合わせ用マーク（アライメントマーク）をパターニングして形成することが望ましい。かかる金属反射膜製アライメントマークは、黒色インキや透明電極と同一材料で構成したアライメントマークに較べ極めて高い反射率を有するため、自動機により光学的にアライメントマークを読取らせて位置合わせする際に、容易かつ高精度にこれを行える利点を有している。

【００３３】尚、請求項１～６に係る発明において上記背面電極板の一部を構成する基板としては、ガラス板、セラミック板、プラスチックフィルム、プラスチックボード等が使用でき、それが透明若しくは不透明であってもよい。また、白又は黒色に着色されたものであってもよいが、上記金属反射膜の存在しない画素間部位からの光反射を防止して表示画面のコントラスト向上を図る観点からは黒色等の光吸収性の高い色彩に着色されたものが望ましい。また、上記基板は、放熱性や剛性を向上させるため金属板で裏打ちされたものであってもよく、アルミニウム等の金属薄膜をラミネートしたプラスチックボードやプラスチックフィルムであってもよい。尚、アルミニウム薄膜のように酸化され易い金属の薄膜を備える場合には、SiO_2 等の無機酸化物薄膜を下引きした後に上記金属薄膜を成膜したものであってよい。

【００３４】また、請求項１～６に係る発明において上記金属反射膜に適用できる材料としては、アルミニウム、アルミニウム合金、銀、マグネシウム、ニッケル合金、カリウム、ナトリウム、ロジウム、亜鉛、アンチモン等の可視光線反射率の高い金属が好ましく、これら高反射率金属の複数を積層した多層膜であってもよい。また、これら金属反射膜の上に、これら金属反射膜のパターニング工程におけるエッチング加工に支障のでない範囲で無機酸化物薄膜やフッ化マグネシウム等を設けたものであってもよい。

【００３５】一方、透明電極としては、酸化インジウムの中にドーパントとして酸化錫を混合して成るＩＴＯ薄

膜、酸化インジウムの中に酸化ジルコニウム、酸化チタン又は酸化マグネシウムを添加して構成される薄膜、あるいは酸化亜鉛の中に酸化アルミニウムを添加して構成される薄膜等が適用できる。

【００３６】尚、本発明に係る背面電極板は、ＴＮ（ツイスト・ネマティック）型液晶表示装置、ＳＴＮ（スーパー・ツイスト・ネマティック）型液晶表示装置、強誘電性液晶表示装置、反強誘電性液晶表示装置、ホメオトロピック液晶表示装置、高分子分散型液晶表示装置、ゲストホスト型液晶表示装置等の各種反射型液晶表示装置の背面電極板として適用することが可能である。

【００３７】

【作用】請求項１～５に係る発明によれば、基板面上に金属反射膜が一様に設けられていた従来のものと相違して上記基板上の画素パターン若しくは透明電極パターンに対応した部位に金属反射膜が選択的に設けられており、かつ、これ等の画素パターン若しくは透明電極パターンは互いに独立したパターン形状を有しているためこれ等パターンに対応した金属反射膜も独立したパターン形状を有している。

【００３８】従って、独立したパターン形状を有する金属反射膜と複数の透明電極との間で短絡を生じた場合であっても、金属反射膜を介して複数の透明電極間が導通することはないため、一の透明電極に電圧を印加して液晶物質を駆動する際にも他の透明電極が駆動されることがなく、欠陥のない画面表示が可能となる。

【００３９】また、観察者側電極板から入射した光線は上記金属反射膜上に設けられた光散乱膜により均一に散乱されかつ金属反射膜で反射されて観察者側電極板から出射されるため、その入射光線の入射角度の如何によらずあらゆる方向で明るい表示画面を観察させることが可能となる。

【００４０】一方、請求項６に係る発明によれば、基板上に金属反射膜を一様に成膜し、かつ、この金属反射膜上に光散乱性感光性レジストを塗布し、露光・現像して上記画素パターン若しくは透明電極パターンに対応した部位に光散乱層を選択的に形成した後、この光散乱層をレジストパターンにして上記金属反射膜をエッチングし、次いで、これ等金属反射膜と光散乱膜が形成された基板上に透明電極を設けているため、画素パターン若しくは透明電極パターンに対応した部位に位置整合された金属反射膜と光散乱膜を具備する請求項１記載の発明に係る液晶表示装置用背面電極板を簡便にかつ確実に製造することが可能となる。

【００４１】

【実施例】以下、図面を参照して本発明の実施例について詳細に説明する。

【００４２】［実施例１］この実施例に係る液晶表示装置用背面電極板は、図１に示すように厚さ０．７ｍｍのガラス基板１と、このガラス基板１上の画素パターン

（１画素：横９０μｍ×縦３１０μｍ、配列のピッチ：横方向１１０μｍ、縦方向３３０μｍ）に対応した部位に設けられた厚さ０．８μｍの矩形状の金属反射膜２と、この金属反射膜２上に位置整合されて設けられた光散乱膜３と、これ等金属反射膜２と光散乱膜３が設けられたガラス基板１上に配設され複数の画素が構成するマトリクスの行又は列に対応するストライプ形状の透明電極４とでその主要部が構成されている。

【００４３】尚、上記金属反射膜２は、厚さ０．８μｍのアルミニウム薄膜で構成し、また、光散乱膜３は、フェノール・ノボラック・エポキシ樹脂を骨格として感光性を付与した感光性透明樹脂内に平均粒径０．１μｍの酸化チタン微粉末が均一に分散された厚さ０．５μｍの膜で構成したものである。一方、上記透明電極４は酸化インジウムにドーパントとして酸化錫を添加した厚さ２４０ｎｍのＩＴＯ薄膜で構成されている。

【００４４】そして、この背面電極板は以下のような工程を経て製造されている。

【００４５】すなわち、図２（Ａ）に示すようにガラス基板１面上に膜厚０．８μｍのアルミニウムを一様にスパッタリングして金属反射膜２’を形成した後、図２（Ｂ）に示すように、上記金属反射膜２’上へ酸化チタン微粉末が均一に分散されたフェノール・ノボラック・エポキシ感光性透明樹脂３’を塗布し、画素パターン状に露光・現像して矩形状の光散乱層３を形成した（図２Ｃ参照）。次に、形成された光散乱層３をレジストパターンにし、かつ、燐酸、硝酸、酢酸及び水の混酸をエッチング液として上記金属反射膜２’をエッチングして光散乱層３と同一形状の金属反射膜２を形成した（図２Ｄ参照）。

【００４６】次に、金属反射膜２と光散乱膜３が設けられたガラス基板１を２００℃、３０分の条件で乾燥した後、これ等金属反射膜２と光散乱膜３が設けられたガラス基板１上にＩＴＯ薄膜を一様に成膜し、ポジ型レジストを使用して周知のフォトリソグラフィ処理を施し上記ストライプ形状の透明電極４を形成して図１に示された背面電極板を製造した。

【００４７】［実施例２］図３に示すように、上記光散乱膜３上に位置整合されて設けられた三色（赤色、緑色、及び青色）のカラーフィルター層５Ｒ、５Ｇ、５Ｂと、全面に一様に塗布形成された透明保護層６とを具備し、かつ、この透明保護層６上に上記透明電極４が配設されている点を除き実施例１に係る背面電極板と略同一である。

【００４８】尚、上記カラーフィルター層５Ｒ、５Ｇ、５Ｂは、それぞれ、東洋インキ製造（株）製ＳＭＸ　ＣＦ　ＳＭＥの赤色インキ、緑色インキ、青色インキを厚さ約１．７μｍに凹版オフセット印刷して構成したものである。また、透明保護層６は厚さ１μｍのフェノール・ノボラック・エポキシ感光性樹脂により構成し、上記

9

透明電極４は酸化インジウムにドーパントとして酸化錫を添加した厚さ２５０ｎｍのＩＴＯ薄膜で構成されている。

【００４９】

【発明の効果】請求項１～５に係る発明によれば、独立したパターン形状を有する金属反射膜と複数の透明電極との間で短絡を生じた場合であっても、金属反射膜を介して複数の透明電極間が導通することはないため、一の透明電極に電圧を印加して液晶物質を駆動する際にも他の透明電極が駆動されることがなく欠陥のない画面表示が可能となり、かつ、観察者側電極板から入射した光線は上記金属反射膜上に設けられた光散乱膜により均一に散乱されかつ金属反射膜で反射されて観察者側電極板から出射されるため、その入射光線の入射角度の如何によらずあらゆる方向で明るい表示画面を観察させることが可能となる。

【００５０】従って、反射型液晶表示装置の利点を維持したまま、表示欠陥ががなく外光光源の位置に関わりなく視野角が広くしかも明るい画面表示が可能な液晶表示装置用背面電極板を提供できる効果を有している。

【００５１】一方、請求項６に係る発明によれば、画素

10

パターン若しくは透明電極パターンに対応した部位に位置整合された金属反射膜と光散乱膜を具備する請求項１記載の発明に係る液晶表示装置用背面電極板を簡便にかつ確実に製造できる効果を有している。

【図面の簡単な説明】

【図１】実施例１に係る背面電極板の断面図。

【図２】実施例１に係る背面電極板の製造工程を示す説明図。

【図３】実施例２に係る背面電極板の断面図。

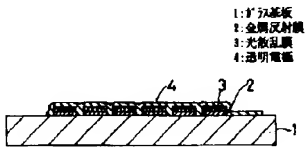
【図４】従来例に係る背面電極板の断面図。

【図５】従来例に係る背面電極板の断面図。

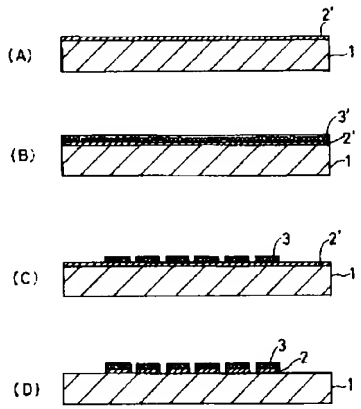
【符号の説明】

１　ガラス基板
２　金属反射膜
３　光散乱膜
４　透明電極
５Ｒ　カラーフィルター層
５Ｇ　カラーフィルター層
５Ｂ　カラーフィルター層
６　透明保護層

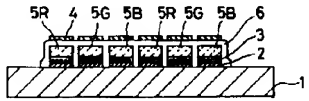
【図１】



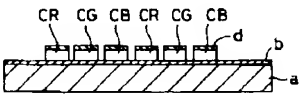
【図２】



【図３】



【図４】



【図５】